LANDS AND INTEGRATED PROGRAMS DIRECTORATE

DIRECTION GÉNÉRALE DES TERRES
ET DES PROGRAMMES INTÉGRÉS

Terrain Sensitivity to Acidic Precipitation in Nova Scotia

Atlantic Region

Région de L'Atlantique

Environment Canada
Environnement Canada

Canada

TERRAIN SENSITIVITY TO ACIDIC PRECIPITATION IN NOVA SCOTIA

Harry E. Hirvonen

ERRATA

Page v	Table 2 should read: Sensitivity Classes for the Land Regions of Nova Scotia	
Page 13	Listed Percentages should read:	
	Moderately high sensitivity	25 %
	High sensitivity	60 %

Lands and Integrated Programs Directorate
Atlantic Region
Environment Canada

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ABSTRACT

The Province of Nova Scotia is characterized by acidic precipitation between pH 4 and pH 5, much lower than the pH 5.6 of normal precipitation. The significance of this continual acidic loading on the landscape is dependant on the ecological makeup of that landscape.

In order to provide a broad framework within which the sensitivity of the province's terrain may be reviewed, four terrain sensitivity classes were developed. Each provincial Land Region was interpreted as being of high, moderately high, moderately low, or low sensitivity. This sensitivity classification is based on the relative buffering capacity of the Land Region to neutralize acidic precipitation. Under this rating system, 85 percent of the province is considered as having moderately high to high sensitivity to acid precipitation.

RÉSUMÉ

Le pH des précipitations en Nouvelle-Écosse est compris entre 4 et 5, ce qui est beaucoup plus acide que la valeur habituelle de 5,6.

L'importance de l'apport continu en substances acides dépend de la composition de l'écosystéme récepteur. Afin de constituer un cadre trés large à l'interieur dequel il setait possible d'étudier la sensiblité des terres de cette province, on a établi quatre catégories de sensibilité, soit élevée, moyennement élevée, moyennement faible et faible. Cette classification est basée sur la capacité tampon relative de la région, c'est-à-dire sa capacité a neutraliser les précipitat. ons acides. Selon cette classification, 85p. cent des terres de la Nouvelle-Écosse possédent une sensibilité aux précipitations acides allant de moyennement élevée à élevée.

ACKNOWLEDGEMENTS

Much of the collation, compilation and synthesis of background data for this project was carried out under the direction of Ms. Dawn Allen. Noel Blais and Christian Carrier, both students of the University of Sherbrooke Francophone Co-operative Program, were mainstays in the development of the preliminary drafts of the map during their respective four-month assignments. Mr. Ron Howatt of the Inland Waters Directorate and Ms. Lisa Allen of John Peters Management Limited prepared the final drafts of the black and white and colour maps, respectively. Background information on the development of the provincial Land System, District and Region maps was provided by Mr. Ed Bailey of the Nova Scotia Department of Lands and Forests.

Many thanks go to all these people whose contributions were instrumental in the completion of this project.

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CHAPTER I

INTRODUCTION

Nova Scotia, along with the rest of the Maritimes, has been termed a "receptor" of acid rain. The concentrated, industrial base of Upper Canada and the eastern Seaboard of the United States is the source of approximately 70 percent of the acid loading for the Province (Shaw 1979a). Industrial sources within the Province contribute the remainder.

This high ratio of external versus internal sources of air pollution is a result of the prevailing westerly winds that transport, over long distances, a seemingly inexhaustible supply of sulphates and nitrates to Atlantic Canada. Local measurements of rainfall acidity have revealed pH values of 4.0 to 5.0, well below pH 5.6 - the acidity level which is considered to characterize normal rainwater (Shaw 1979b).

How does this acidified precipitation affect the ecological integrity of Nova Scotia? Preliminary research indicates grim prospects in the area of the sport fishery. Readings of surface water pH of several salmon rivers of southwest Nova Scotia relate a story of continual decline in salmon numbers (Watt 1981). For example, the low pH levels of the Mersey River are thought to be a major factor in the demise of the native fish stock for that river. The Nova Scotia Salmon Association contends that nine fishing rivers have already lost their salmon runs as a result of low pH values.

The relationship of pH to the viability of certain fish stocks is one of the few quantifiable relationships to be identified from acid rain research to date. Effects of increased acid loading on other aspects of the landscape such as soils, vegetation, and fauna are harder to pinpoint.

Certain fauna and flora, for example, may not be affected immediately by the lowering of pH values; indeed, effects may not become evident until several years down the road. Until research reveals more distinct relationships, there exists a need to provide a "window" by which to view the potential for negative impact of continued and prolonged acid loading on the landscape. The development of a relative scale of terrain sensitivity to acid precipitation can provide this window and, in turn, indicate where to concentrate scarce research funds. Necessarily, due to lack of research data, these ratings must be partly subjective in nature. However, if underlying assumptions are outlined and inferred ecological interrelationships explained, such ratings can aid in regional planning and assessment of the acid rain problem.

CHAPTER II

THE DETERMINATION OF TERRAIN SENSITIVITY

2.1 Definition

Terrain sensitivity to acid loading, within this report, refers to the relative capacity of a certain landscape to buffer acidic precipitation as it passes over or through that landscape. The assumption is that increased buffering capacity equates to reduced terrain sensitivity. For example, if precipitation averages pH 4.0, within a certain watershed, and receiving waters of that same watershed average pH 5.0, the landscape is assumed to have neutralized (i.e. buffered) that precipitation. Any one number increase or decrease in pH reflects a tenfold change as the pH scale is logarithmic in nature.

Correlations, however, in a natural watershed are not that straightforward. Groundwater intrusion and local sources of acidity may be key variables affecting overall surface water acidity. Even within the biophysical makeup of a landscape, the question of which parameter or parameters outweigh others in reducing acidity is complex. Factors such as vegetative cover, soil depth, drainage and texture, type of bedrock and degree and length of slope all have varying influences on terrain sensitivity.

Naturally, there are always exceptions to general trends or interrelationships. These exceptions are assumed to be site specific and of inconsequential significance at a Provincial scale of analysis. In addition, certain major ecological linkages may not yet be evident due to lack of research. Yet, if one is able to categorize relative sensitivities of a landscape using readily available information, then the value of sensitivity ratings becomes apparent.

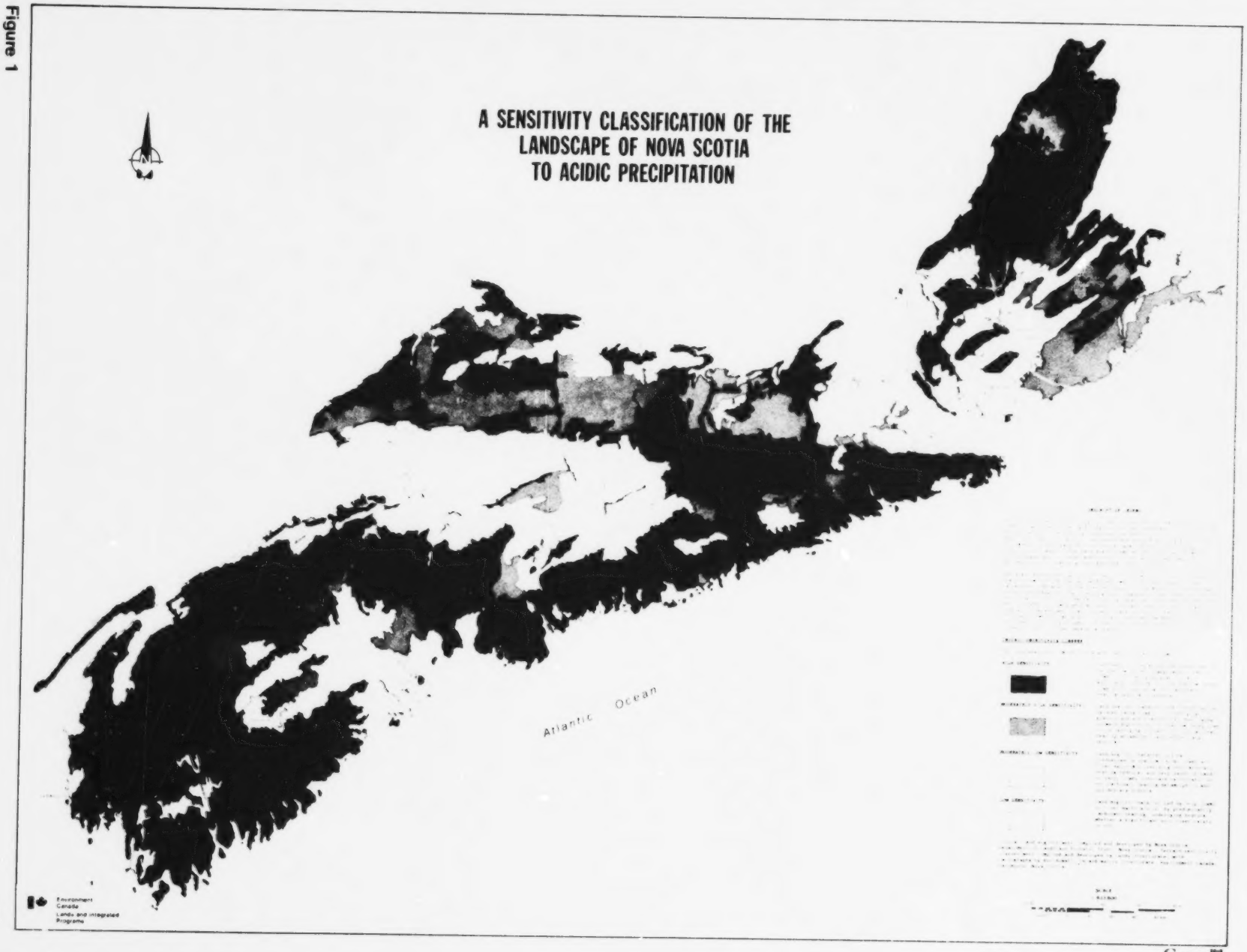
2.2 Methodology

2.2.1 Background Information

Figure 1 depicts the distribution of terrain sensitivity determined for the Province. The base map upon which the sensitivity ratings are applied is Land Regions of Nova Scotia (scale 1:500 000) prepared by the Nova Scotia Department of Lands and Forests. The use of this base map was ideal from two aspects. Firstly, each Region is defined in terms of topographic pattern, slope, geology, and type and texture of the surficial material, all key to the determination of terrain sensitivity ratings. Secondly, Land Regions are the most general hierarchial level of terrain classification conducted by the Province. They represent a collation of more detailed data available from Land District (scale 1:250 000) and Land System (scale 1:50 000) maps. Each specific Region may be sub-divided into Districts, with these Districts again being composed of Systems. Thus, the process of data collation is structured and, if need be, one can trace the steps involved in the development of the Land Regions.

Other sources of information included the maps "Soils of Nova Scotia" (scale 1:450 000) and "Geology of Nova Scotia" (scale 1:506 000) both produced by the Province and a map depicting ecoregions of the maritimes (scale 1:1 000 000) prepared by Lands Directorate, Environment Canada. As well, the reports and maps of the soils of individual counties were consulted when further clarification was desired. The works of Shilts (1981), Cowell et al. (1981), and the Memorandum of Intent on Transboundary Pollution published by a United States/Canada Working Group in 1981, served as the major background literature to this report. The final map of terrain sensitivity for Nova Scotia that accompanies this report is produced at a scale of 1:633 000.

Figure 1


A SENSITIVITY CLASSIFICATION OF THE
LANDSCAPE OF NOVA SCOTIA
TO ACIDIC PRECIPITATION
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2.2.2 Categorization of Biophysical Parameters

Table 1 describes landscape parameters which reflect relative categories of buffering capacity. When reference is made to this table, it must be remembered that the delineation of the major ecological parameters into one of four relative categories of buffering capacity serves only to develop the basic framework. Factors such as drainage, permeability, occurence of organics, terrain chemistry, and juxtaposition of these parameters are analysed to produce sensitivity on a Land Region basis.

2.2.3 Development of Analytical Framework

Table 2 defines the four terrain sensitivity classes for the Province derived from the Land Regions and associated maps. These definitions are general in nature reflecting the qualitative approach utilized in the collation of ecological interrelations into "workable packages" for interpretive purposes. The major biophysical factors assessed, and criteria developed, within which the class selection took place, are outlined below:

(a) Bedrock: Following the work of Shilts (1981) and Cowell et al. (1981), with slight modifications, all the bedrock types in the Province were categorized into the following categories:

(i) Type One - gypsum, limestone, calcite, anhydrite, marble;

(ii) Type Two - conglomerate, shale, siltstone, mudstone, schist, slate, andesite, rhyolite, diorite, gabbro, basalt;

(iii) Type Three - sandstone, quartzite, gneiss, granite.

TABLE 1

Relative Categories of Buffering Capacity of Major Biophysical Components of the Land Region*

Parameter	High	Moderately High	Moderately Low	Low
Bedrock	Limestone, gypsum and other carbonate bearing bedrock	Shale, siltstone and other fine-grained sedimentary bedrock	Conglomerate, shists slate, andesite, rhyolite diorite, basalt	Sandstone, quartzite gneiss, granite, and related rocks
Unconsolidated deposits	Deep loams and finer-textured marine, lacustrine and moralnal deposits	Shallow, fine textured marine deposits, moderately deep loams, and fine-textured lacustrine and moralnal deposits	Deep outwash and colluvium and coarse-textured moralnal deposits Moderately shallow moralnal and lacustrine deposits of loam texture	Shallow outwash colluvium and coarse-textured moralnal deposits
Vegetation	Hardwood forest cover	Mixedwood forest cover	Softwood forest cover	Sparse tree cover

* Land Region as defined by Nova Scotia Department of Lands and Forests and as depicted on the map entitled: Land Regions of Nova Scotia produced by that Department.

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TABLE 2

The Land Regions of Nova Scotia are classified into one of the following classes:

High Sensitivity	Moderately High Sensitivity	Moderately Low Sensitivity	Low Sensitivity
Land Regions characterized predominantly by shallow (≤ 1 m), loamy sand to sandy-loam tills overlying granitic and associated bedrock or very shallow sandy loam soils overlying non-carbonate bearing bedrock	Land Regions characterized predominantly by deep, sandy-loam tills overlying granite and associated rock, deep, sandy, outwash deposits or shallow, sandy-loam tills overlying volcanic or non-carbonate bearing metamorphic and sedimentary bedrock	Land Regions characterized predominantly by shallow (≤ 1 m) loams and finer-textured materials overlying non-carbonate bearing bedrock, and deep sands or sandy-loams underlain by volcanic or non-carbonate bearing metamorphics and sedimentary bedrock	Land Regions characterized by deep loams or finer-textured materials, or by predominantly carbonate bearing bedrock, whether a significant soil cover exists or not.

Bedrock within Type One, being carbonate bearing, is considered to be non-sensitive to acid loading. Type Two rocks are deemed intermediate in sensitivity and the latter category consists of sensitive bedrock.

(b) Unconsolidated Material: Soil textures were divided into the following two categories for interpretive purposes.

(i) Coarse - all textures classified as sandy loams or coarser;

(ii) Fine - all textures classified as loams or finer.

Due to the maritime climate of Nova Scotia, characterized by cool temperatures and relatively high precipitation, a strong correlation exists between soil texture and soil acidity. For the most part, the coarser the soil texture, the more acidic is the soil. In contrast, loams and clay loams are characterized by higher pH levels. These soils, due to their higher cation exchange capacity, have a greater inherent ability to neutralize the sulphate and nitrate ions than do soils of coarser texture. Also, coarse-textured soils (common on the predominately shallow tills of Nova Scotia) tend to increase leaching of valuable cations such as Ca^{++}, K^{+}, and Mg^{++}, thus reducing the nutrients available to plants.

Given these factors, coarse soils are considered sensitive and fine-textured deposits as non-sensitive to acidic loading. Again, this basic subdivision serves only as a first-cut framework within which factors such as geology and marine influence are superimposed.

(c) Vegetation: Vegetative cover was not available from the maps depicting Land Regions, Districts or Systems. These data were derived from Ecoregions developed by Lands Directorate, Environment Canada, as modified from Loucks (1962), and superimposed on Land

Region boundaries as required. As outlined in Table 1, vegetation was categorized simply as hardwood, softwood, and mixed wood forest or consisting of sparse tree cover. Following the suggestion of Robitaille (1980), hardwoods tend to increase the buffering capacity of the soil because of increased organic matter buildup through leaf litter. The relative effect of needle fall on soil cover from non-sensitive hardwoods to sensitive softwoods and treeless terrain was made. Vegetative ground cover was not considered.

2.2.4 Application of Relative Weightings

Although bedrock, soils and vegetation, with their topographic and physical modifiers, were considered in the development of the terrain sensitivity ratings, all three components were not given equal weightings. In fact, the two extreme classes, i.e., high and low sensitivities, were determined solely from analyses of bedrock geology and soil depth and texture. Vegetative cover was considered only for those Land Regions where a toss-up remained after the analysis of terrain parameters could not determine placement into either moderately high or moderately low categories of sensitivity.

Table 3 presents a key to the determination of sensitivity ratings for acid loading. A glance at the key reveals heavy weighting given to Type One (carbonate-bearing) bedrock and soils of fine texture. If a particular Land Region was composed of calcareous bedrock, it was considered to be of low sensitivity no matter what the soil or vegetative cover. The reasoning for this is that the reaction of acid waters with carbonate bedrock is assumed to neutralize that water, thus posing no threat to the terrestrial and aquatic ecosystems of that Region. Similarly, Land Regions with fine-textured soils, because of good cation exchange capacities and high sulphate adsorption, are considered not sensitive even though the underlying bedrock may be acidic granite.

TABLE 3

Key to Determination of Sensitivity Ratings

1.0	Average depth of overburden >1 m		
	1.1	Fine-textured soils	Low Sensitivity
	1.2	Coarse-textured soils	
		1.2.1 Underlain by bedrock of Type One	Low Sensitivity
		1.2.2 Underlain by bedrock of Type Two	Moderately Low Sensitivity
		1.2.3 Underlain by bedrock of Type Three	Moderately High Sensitivity
2.0	Average depth of overburden <1 m		
	2.1	Soil cover <1 m with minimal exposed bedrock	
		2.1.1 Fine-textured soils	
		2.1.1.1 Underlain by bedrock Type One	Low Sensitivity
		2.1.1.2 Underlain by bedrock of Type Two	Moderately Low Sensitivity
		2.1.1.3 Underlain by bedrock of Type Three	Moderately High Sensitivity
		2.1.2 Coarse-textured soils	
		2.1.2.1 Underlain by bedrock of Type One	Low Sensitivity
		2.1.2.2 Underlain by bedrock of Types Two and Three	High Sensitivity
	2.2	Exposed bedrock	
		2.2.1 Bedrock of Type One	Low Sensitivity
		2.2.2 Bedrock of Types Two or Three	High Sensitivity

Calcareous outwash and other coarse-textured deposits were considered insignificant at the Land Region level within the Province. Thus, a direct correlation was assumed between acidity and soil texture: the coarser the soil, the lower the pH of that soil. Carbonates and other salts do not significantly accumulate at deeper soil depths of these soils. Thus pH is assumed to be low and relatively constant with depth to bedrock. Precipitation would percolate through the soil with minimal chemical reactions taking place. Accordingly, emphasis was placed on underlying bedrock to determine buffering potential as the overburden was deemed to have minimal effect on this potential. Compaction and the development of ortsteins or impermeable "hard pan" within the soil profile were not considered. These factors greatly influence permeability and increase surface runoff of acid precipitation which would, in effect, reduce the buffering provided by calcareous bedrock if it were present. Again, through analysis of available background data, such a combination of compact coarse-textured overburden overlying limestone or allied rock was considered too insignificant to key out separately.

Other factors such as drainage and slope play major roles in infiltration and chemical reactions. These factors, however, tend to be site specific and have complex ecological interrelationships. Research data do not exist on which to confidently predict reactions. To circumvent this lack of data and reduce analyses of all possible biophysical parameters, data synthesis was restricted to general landform and geological characteristics. Thus, interpolation of the sensitivity ratings to more detailed analysis than suggested by the scale of presentation of the Land Region is not justified.

2.2.5 Assessment of Complexity Within Land Regions

Nova Scotia is divided into 42 Land Regions. These Regions represent 42

differing combinations of topography, landform and geology with relative homogenity occurring within each Region. However, not all ecological complexities could be eliminated. In certain Land Regions, terrain diversity, due, in large part, to complex bedrock geology, is such that these Regions could have been compartmentalized into two or more sensitivity classes. Rather than segment these Regions, the various sensitivity classes were amalgamated into one rating for each Region. Table 4 outlines the limits set for each class.

TABLE 4

Limits of Terrain Sensitivity Classes for Complex Land Regions

Sensitivity Class	Limits of Sensitivity Class
Low sensitivity	Greater than 75 percent of Land Region classed as low sensitivity
Moderately low sensitivity	Greater than 50 percent of Land Region classed as low to moderately low sensitivity and less than 75 percent of Land Region classed as low sensitivity
Moderately high sensitivity	Greater than 50 percent of Land Region classed as high to moderately high sensitivity and less than 75 percent of Land Region classed as high sensitivity
High sensitivity	Greater than 75 percent of Land Region classed as high sensitivity

CHAPTER III

SUMMARY OF RESULTS

The final map depicting the four categories of terrain sensitivity of the landscape of Nova Scotia was reduced from the original base scale of 1:500 000 to approximately 1:633 000 (1 cm to 16 Km) for ease of presentation. Relative proportions of each class to the total area of Nova Scotia are:

Low sensitivity	5 percent
Moderately low sensitivity	10 percent
Moderately high sensitivity	[illegible] percent
High sensitivity	[illegible] percent

These figures indicate that roughly 85 percent of Nova Scotia has terrain characteristics that have minimal buffering capacity to neutralize acidic precipitation. Whether fauna and flora of this terrain are adversely affected by continued acid loading is another question. These sensitivity ratings refer only to the inherent ability of the landscape to reduce the acidity of waters passing through that landscape and not to biota relying on that landscape for food and habitat.

Sulphate and nitrate loadings on the landscape of Nova Scotia vary from 3 to 8 kg/ha/month with substantial seasonal fluctuations (Impact Assessment Working Group 1981). Acid loading is a continuing concern within the Province.

With the development of these sensitivity ratings, it is hoped that a workable framework is in place for intra- and interprovincial comparisons of acidic deposition and buffering potential. These ratings were produced for a provincial/regional level of analysis and comparison, and

are not to be considered as definitive. Underlying assumptions may change as research into potential impacts of acidic loading begins to clarify certain ecological interactions. As well, within each Land Region, abnormalities may and do occur. However, as long as a provincial perspective is maintained, this sensitivity delineation of the Province should prove useful for regional management and research decisions.

BIBLIOGRAPHY

Clair, T. A., J. P. Witteman, T. L. Pollack, and S. Whitlow (1979) Sensitivity of the Maritime Provinces to Acidic Precipitation: A Preliminary Report, Manuscript Report, Environment Canada, Water Quality Branch, Atlantic Region. Inland Waters Directorate, Moncton, New Brunswick, 7 pp.

Cowell, D. W., A. E. Lucas, and C. D. A. Rubec (1981) The Development of an Ecological Sensitivity Rating for Acid Precipitation Input Assessment. Working Paper No. 10, Environmental Conservation Service. Environment Canada, Ottawa, Ontario, 42 pp.

Impact Assessment Working Group 1 (1983) United States - Canada Memorandum of Intent on Transboundary Air Pollution, Final Report, 628 pp.

Loucks, O. L. (1962) A Forest Classification for the Maritime Provinces, Forest Research Branch, Department of Forestry, Queen's Printer, Ottawa, Ontario, 79 pp.

Robitaille, G. (1980) Acid Precipitation and Vegetation, Paper presented at 73rd Annual Meeting of the Air Pollution Association, June 22 - 27, 1980, Montreal, Quebec, 71 pp.

Shaw, R. (1979a) Atmospheric Transport and Deposition of Pollutants in the Atlantic Provinces in Proceedings of a Workshop on Long Range Transport of Air Pollution and Its Impact on the Atlantic Region, Dartmouth, Nova Scotia, pp 19 - 24.

Shaw, R. (1979b) Acid Precipitation in Atlantic Canada, Environmental and Science Technology, April, 1979, pp 406 - 411.

Shilts, W. W. (1981) Sensitivity of Bedrock to Acid Precipitation: Modification by Glacial Processes, Geological Survey of Canada Paper No. 81 - 14, Ottawa, Ontario, 7 pp.

Wang, C., and D. R. Coote (1980) Sensitivity Classification of Agricultural Land to Long Term Acid Precipitation in Eastern Canada, Research Branch, Agriculture Canada, Ottawa, Ontario, 9 pp.

Watt, W. D. (1981) Present and Potential Effects of Acid Precipitation of the Atlantic Salmon in Eastern Canada, In Proceedings of the Conference on Acid Rain and the Atlantic Salmon, Special Publication Series of the International Atlantic Salmon Foundation, No. 10 ASF, New York.

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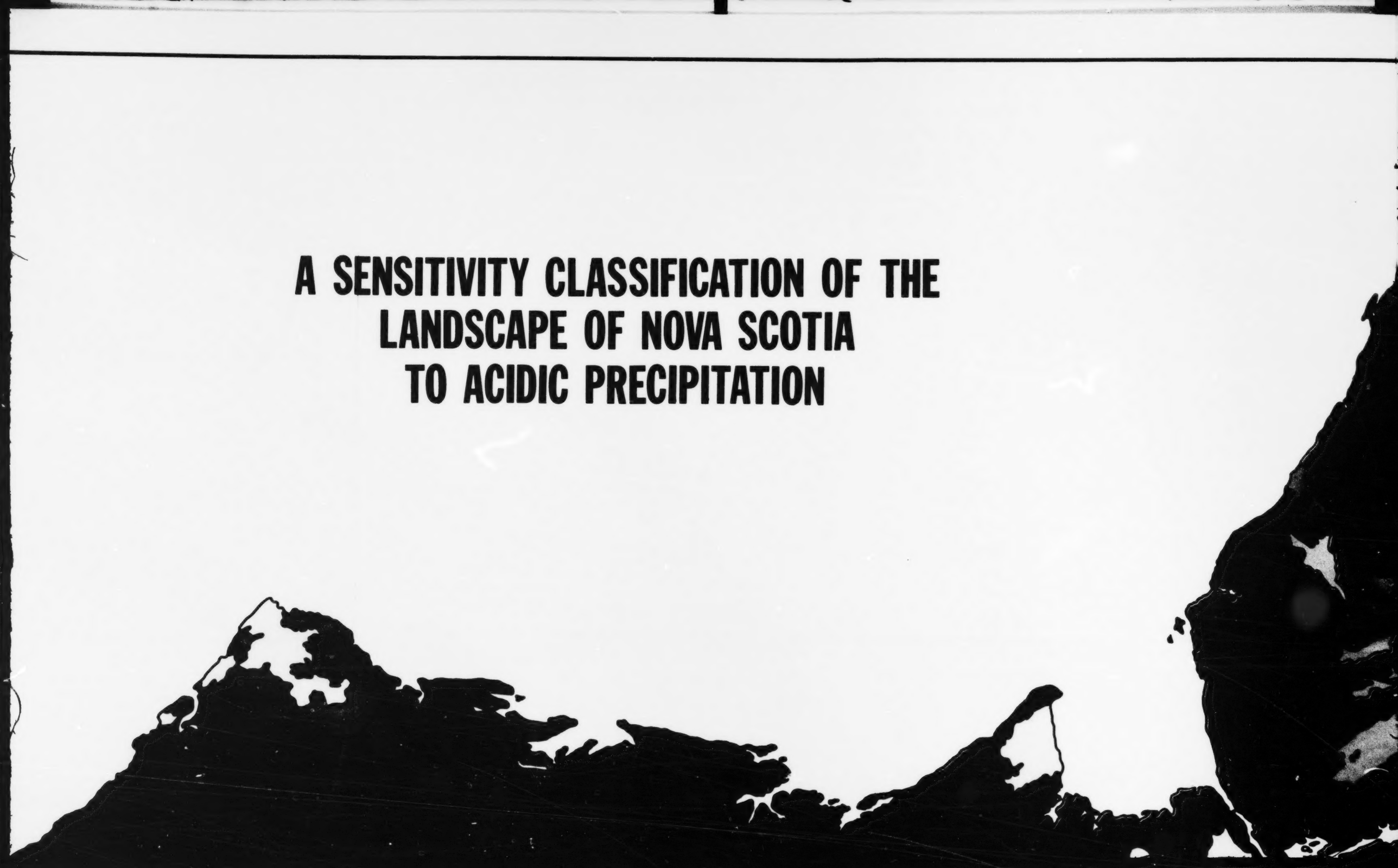

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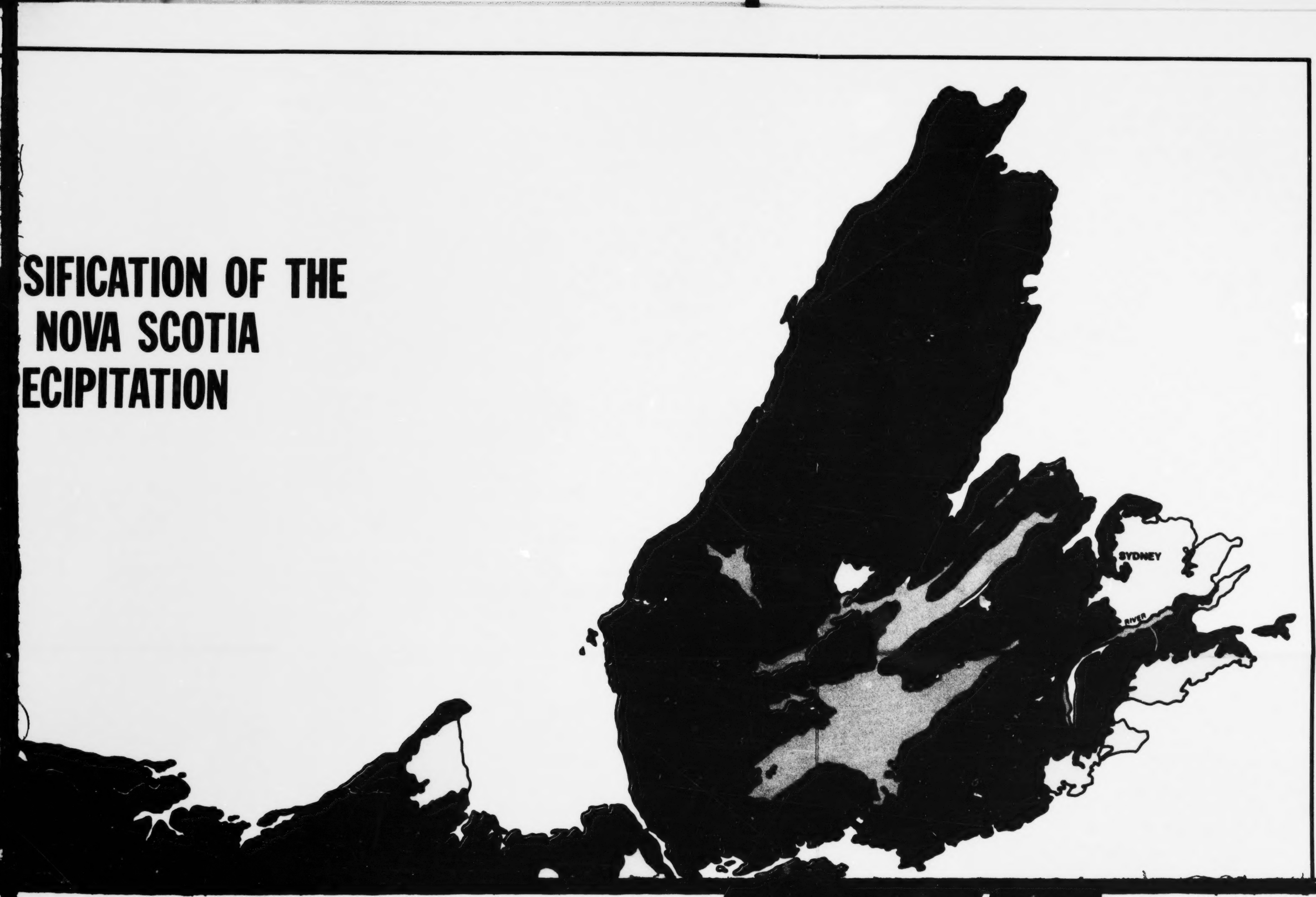

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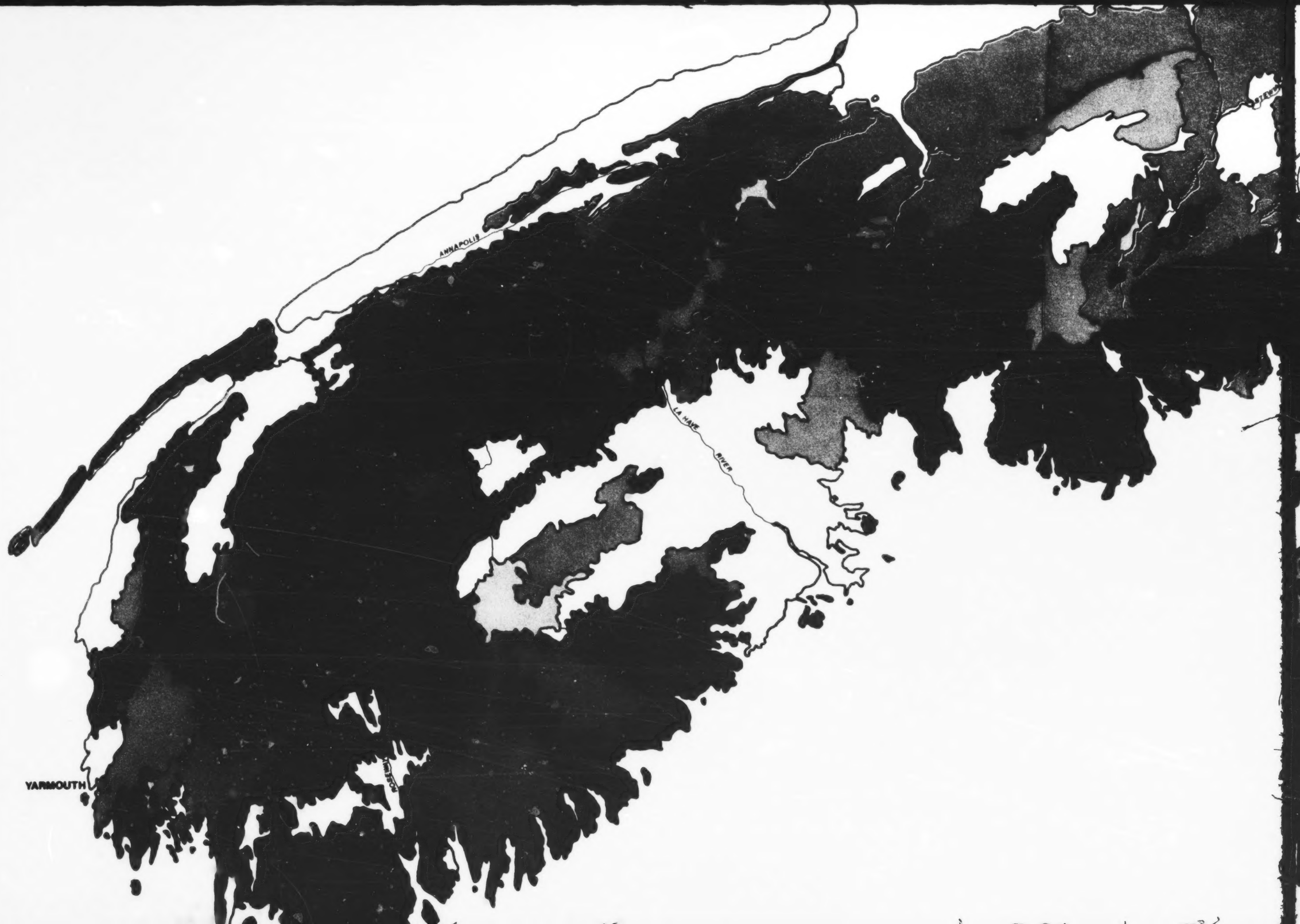
DESCRIPTIVE LEGEND

The term "terrain sensitivity" in the context of this map refers to the inherent ability of the land component of the landscape to buffer acidic precipitation. The physical landscape parameters of soil texture, soil depth, geological origin of overburden and bedrock geology are used as surrogates to delineate this buffering capacity into one of four sensitivity classes. The Land Regions map as developed by the Nova Scotia Department of Lands and Forests serves as the base map for determination of the relative landscape sensitivities.

The qualitative descriptions of the four "terrain sensitivity" classes that follow outline typical landscapes which fall into each of the categories. Because of the diverse nature of the Nova Scotia landscape, certain Land Regions, by necessity, are complex in their physical nature, resulting in turn, in complex buffering capacity. Such Regions may have been upgraded or downgraded a class in terrain sensitivity (if based simply on the average of all terrain characteristics that occur) because of relative weightings given to certain landscape parameters. Further refinement of the development of the four "terrain sensitivity" classes is described in the accompanying report.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Terrain Sensitivity Classes

The Land Regions of Nova Scotia are classified as follows:

HIGH SENSITIVITY – Land Regions characterized predominantly by shallow (< 1m) loamy sand to sandy loam tills overlying granitic and associated bedrock or very shallow sandy loam soils overlying non-carbonate bearing bedrock in general.

MODERATELY HIGH SENSITIVITY – Land Regions characterized predominantly by deep sandy loam tills overlying granite and associated rock, deep sandy outwash deposition, or shallow sandy loam tills overlying volcanic or non-carbonate bearing metamorphic and sedimentary bedrock.

MODERATELY LOW SENSITIVITY – Land Regions characterized by predominantly shallow (< 1m) loams and finer materials overlying non-carbonate bearing bedrock, and deep sands or sands or sandy loams underlain by volcanic or non-carbonate bearing metamorphics and sedimentary bedrock.

LOW SENSITIVITY – Land Regions characterized by deep loams or finer materials or, by predominantly carbonate bearing, underlying bedrock, whether a significant soil cover exists or not.

Initial Land Regions were compiled and developed by Nova Scotia Department of Lands and Forests, Truro, Nova Scotia. Terrain sensitivity classes were compiled and developed by Lands Directorate, with cartography by Ron Howatt, Inland Waters Directorate, Environment Canada, Dartmouth, Nova Scotia.

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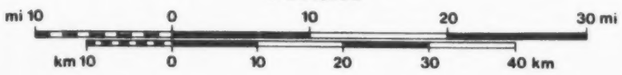

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